



Kill Chains and Weapons on the Tactical Edge

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PMA-201
16 NOV 2005**



Navy Networked Weapons are here !



JSOW Blk 3

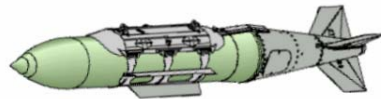


Harpoon Blk 3



SDB II

SLAM-ER



**JDAM with laser
and WDL?**

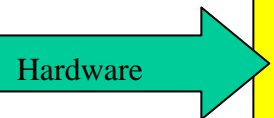


**LGB / DMLGB
with WDL?**

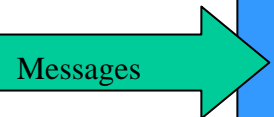
- **JSOW C block 3 – IOC Fy10**
- **Harpoon block 3 – IOC FY 09 (Surface funded, Air-Launched not)**
- **SDB II – Navy likely to wait for SDB 2 until JSF**
- **SLAM-ER – In Service**
- **Dual Mode or Laser JDAM with MMW and WDL?**



Programs underway to support Networked Weapons



- **Weapon Datalink Architecture (WDLA)**
 - Weapon Data Link Architecture AFRL program replaces Banshee ph. I
 - 75 cu in SCA Data Link Box
- **Quint Networking Technology (QNT)**
 - DARPA program building upon and expanding WDLA
 - Low cost SCA 10 and 20 cu in datalink boxes
 - FY05-09



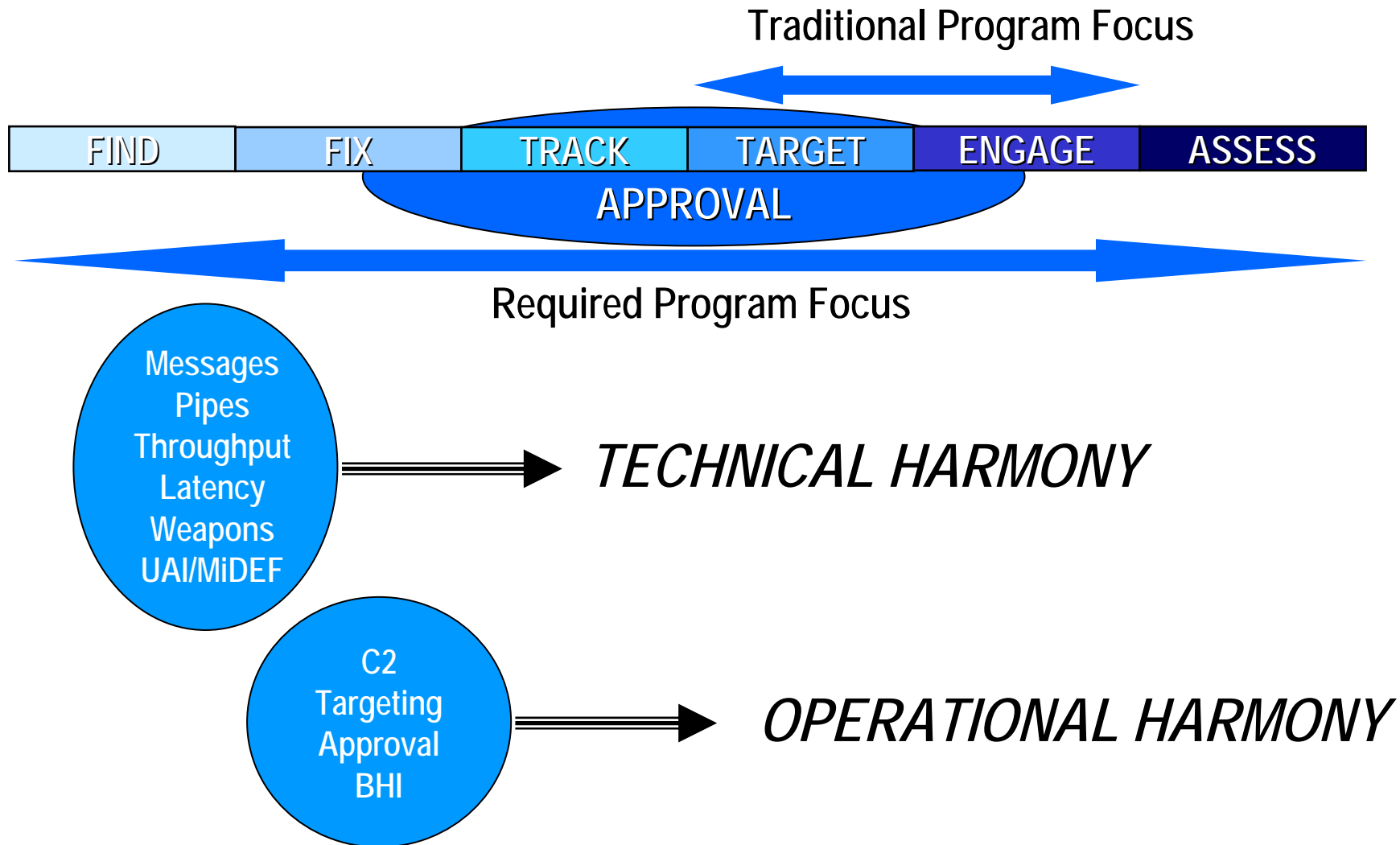
- **Weapon Data Link Network (WDLN) ACTD**
 - Common weapon language across all tactical data links (messages, protocols, network architecture)
 - Ends FY 06

Emphasis of Evolution:

- ✓ WDL Hardware, Network and Message Architectures
- ✓ Weapons have unique requirements:
 - Reduced Size, Disposable Cost, Low Latency,
 - Quick Network Access, Unique Messages

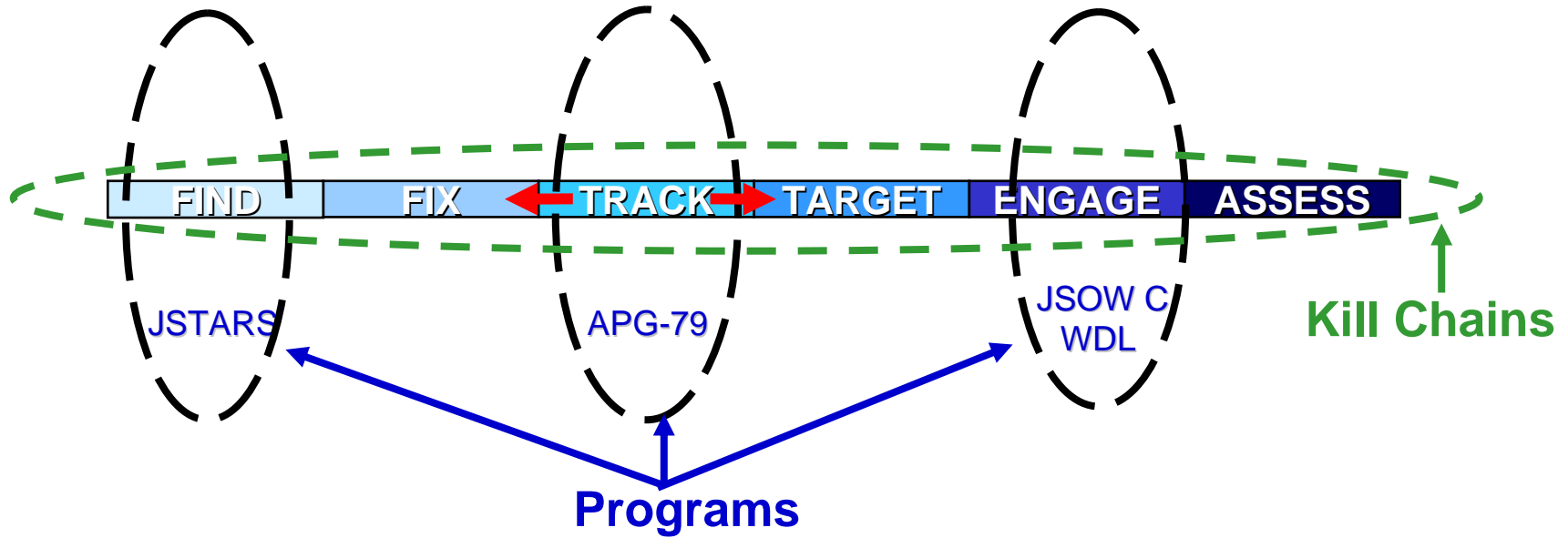


Kill Chain End-to-End Detail





Capability-Based POM

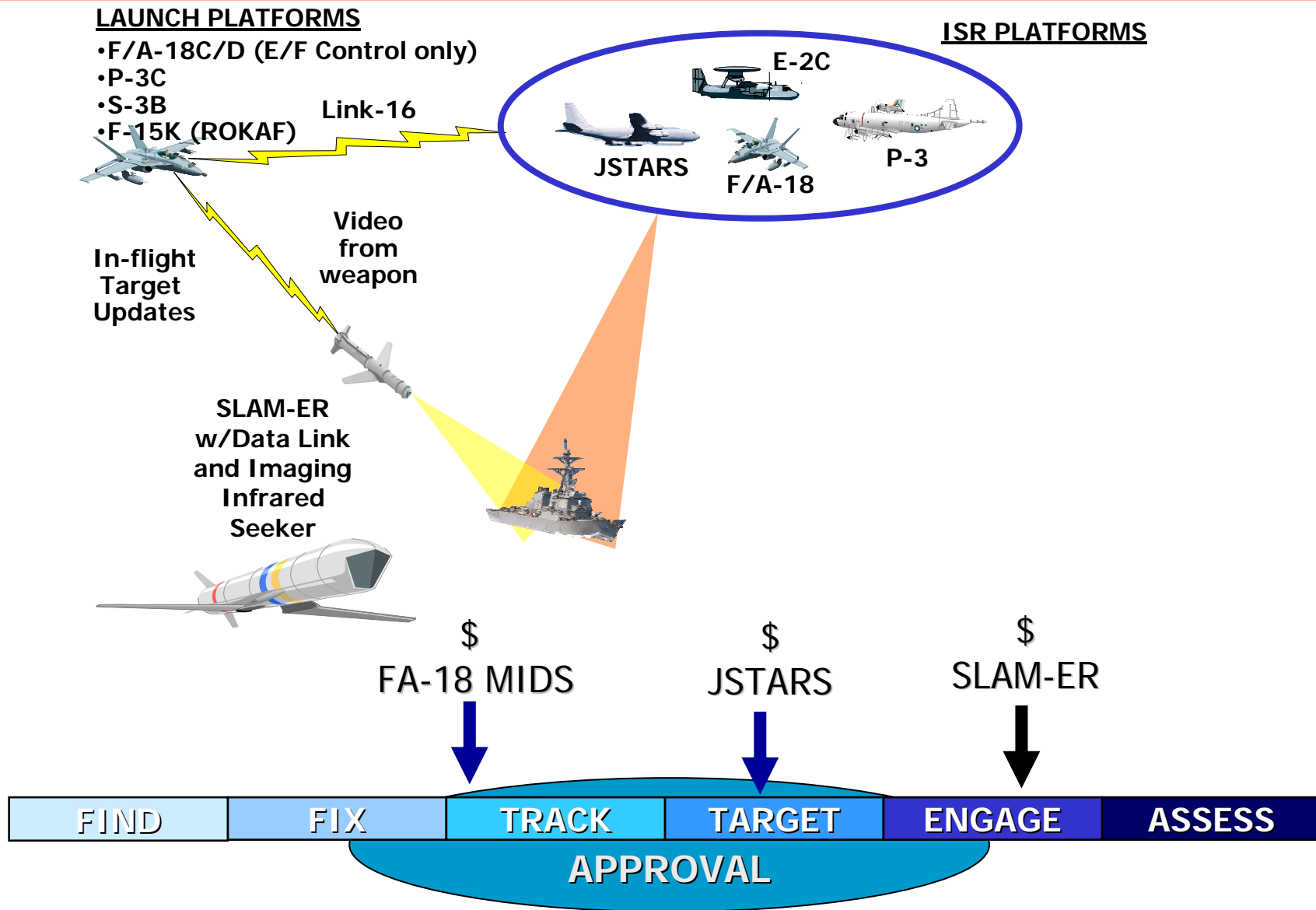


- Systems Engineering between Programs and Kill Chains
- Fund Programs (Business as Usual)
- Fund Kill Chains/Capabilities (Systems Engineering and Integration)

Fiscal Accountability for Capability



We've Done this with SLAM-ER





POM-08 Kill Chain Scope

Guidance

CNO
NCDP
Deep Blue
NSAWC/MAWTS Weapons ESC
CFFC/CNAF Sea Strike FCT
JROC CDDs (Global Strike)

Capability Gaps

TST ASW (future effort)
LMT SuW

*(Also looking at Air-to-Air Warfare
and Cruise Missile Defense)*

- Each has own area of focus
- The sum of these point to capability gaps

TST = Time Sensitive Targeting
LMT = Land Moving Targets
ASW = Anti-Submarine Warfare
SuW = Surface Warfare

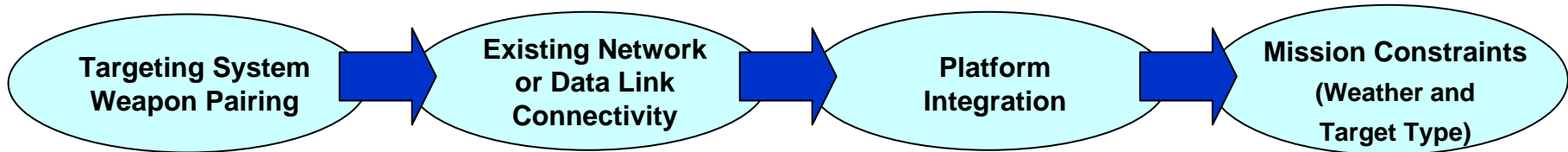
*Gaps well-ID'd: Need decision aiding tool to select
Cost-effective family of solutions*



Kill Chain Context

- Did do:

- Identification of gaps for specific kill chains
 - SuW, LMT, TST
- AAW
- Analyze and score kill chains based on:
 - F2T2EA (TST MTTP – NTP 3-60.1)
 - Score based on:



- Did not do:

- AEA (Jamming)
- ASE (Survivability)
- ASW
- BSN (Time, Volume)
- Combat ID (Approval)
- Full Joint
- Mission Threads
- Sufficiency

- Cannot do:

- Fact of Life



Kill Chain Development Process

Multi-Service Tactics, Techniques, and Procedures for Targeting Time-Sensitive Targets (April 2004)



Capability Gaps
(SuW, ASW, LMT, TST)

Scenarios
(Target, Standoff range, Weather, Weapon)

Kill Chain Elements
FIND **FIX** **TRACK** **TARGET** **ENGAGE** **ASSESS**

Ability to detect and pass target for further investigation

Targeting capability relative to allowable weapon error and ability to pass IFTU to weapon

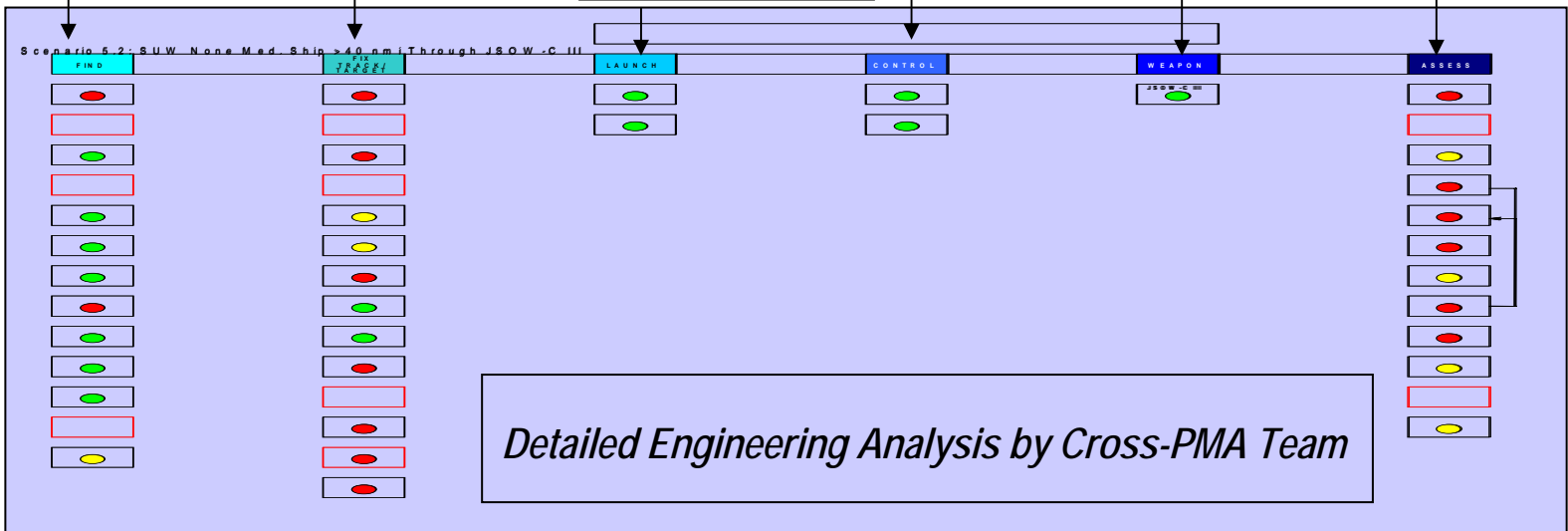
Launch platform capability including auto target data download

Ability to transmit updates

Scenario Weapon

Damage assessment and need to re-attack

Scenario Kill Chain

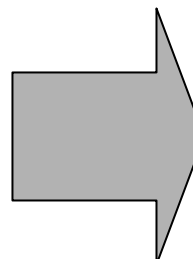




Surface Warfare

SWA-SD		
VM Car		
VM Orca 1803	SAMR	
	SAMRA	
	JSOW/D	
	JSOW/M	
VM Target Orca (32 mph)	J-5V	
	ARM	
	SBILF	
	SBILF	
	Hawkeye III (Arlantre)	

SWA-SD		
VM Car		
VM Orca 1803	SAMR	
	SAMRA	
	JSOW/D	
	JSOW/M	
VM Target Orca (32 mph)	J-5V	
	ARM	
	SBILF	
	SBILF	
	Hawkeye III (Arlantre)	



ENGAGE				WEAPON
E-2	E-2		E-2	JSOW A
P-3	P-3	P-3	P-3	JSOW C
EP-3				JSOW C Bk III
FRED				
MH-60R				
JSTARS				
AV-8B				
FIRESOULT				
AEGIS				
RIVET JOINT				
NTM				
JTAC				
F/A-18E/F				
MMA	MMA	LCS	LCS	JCM
BAMS	BAMS			HSW

- Direct Attack
- Weapons
- Stand Off Area Defense
- Weapons
- Stand Off Theater Defense
- Weapons

The Weapons Strategy focuses on bang-for-buck options.
N-70 studies will further clarify choices to develop
Weapons Investment Strategy



SuW Capability Scenarios

Scenario	Target	Standoff	Weather	Weapon
1.0	Medium ship	>100nmi	Clear	A
2.0	Medium ship	>100nmi	Through	B
3.0	Medium ship	>100nmi	All	C
4.1	Medium ship	>40nmi	Clear	
4.2	Medium ship	>40nmi	Clear	
4.4	Medium ship	>40nmi	Clear	
5.1	Medium ship	>40nmi	Through	
5.2	Medium ship	>40nmi	Through	
5.4	Medium ship	>40nmi	Through	
6.0	Medium ship	>40nmi	All	
9.1	Medium ship	>100nmi	All	
12.1	Medium ship	>40nmi	All	
13.1	Small craft	>40nmi	Clear	
14.1	Small craft	>40nmi	Through	
15.1	Small craft	>40nmi	All	
16.1	Small craft	Direct	Clear	
16.2	Small craft	Direct	Clear	
18.1	Small craft	Direct	All	
19.1	Medium ship	>10nmi	Clear	
21.1	Medium ship	>10nmi	All	
24.1	Small craft	>10nmi	All	

Scenarios Evaluated in Support of POM08

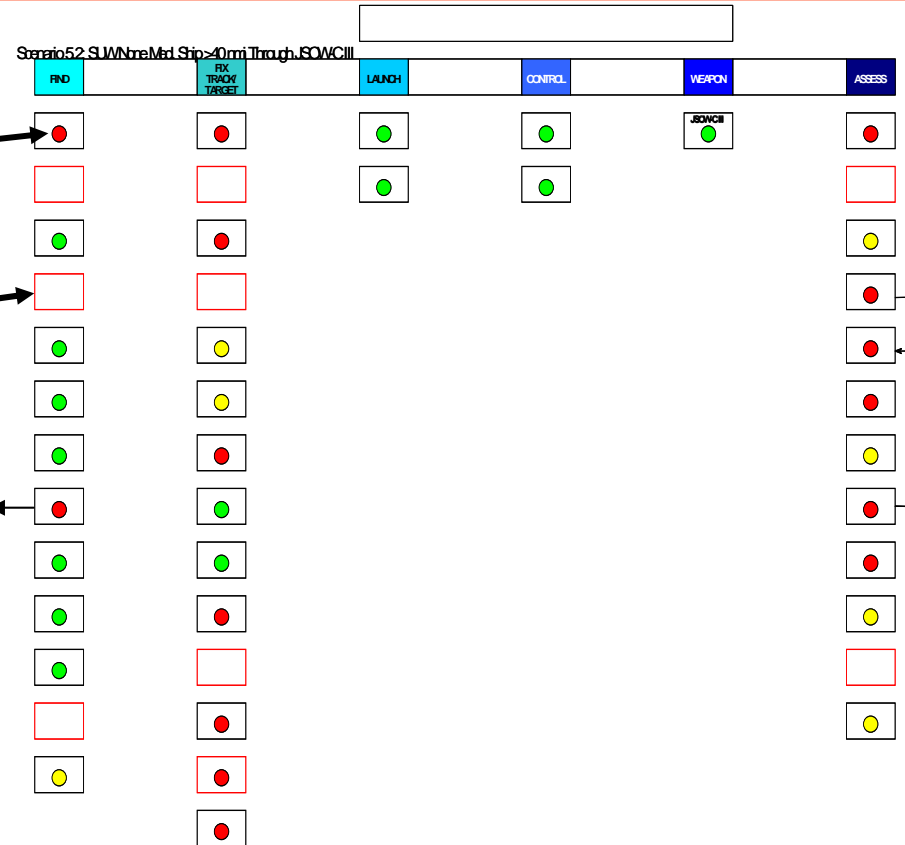


Kill Chain Symbolic Logic



- **Black (outlined) box**
 - Fielded or
 - Fully funded and IOC by 2010
- **Red (outlined) box**
 - IOC beyond 2010 (funded or unfunded)
- **Annotated box**
 - Upgrades
 - POM Issues
 - New score
- **Weather**
 - Clear
 - Overcast (1500/3)
 - Target obscured (<1/2 nmi visibility)

Issue Sheet



• Scoring Bins:

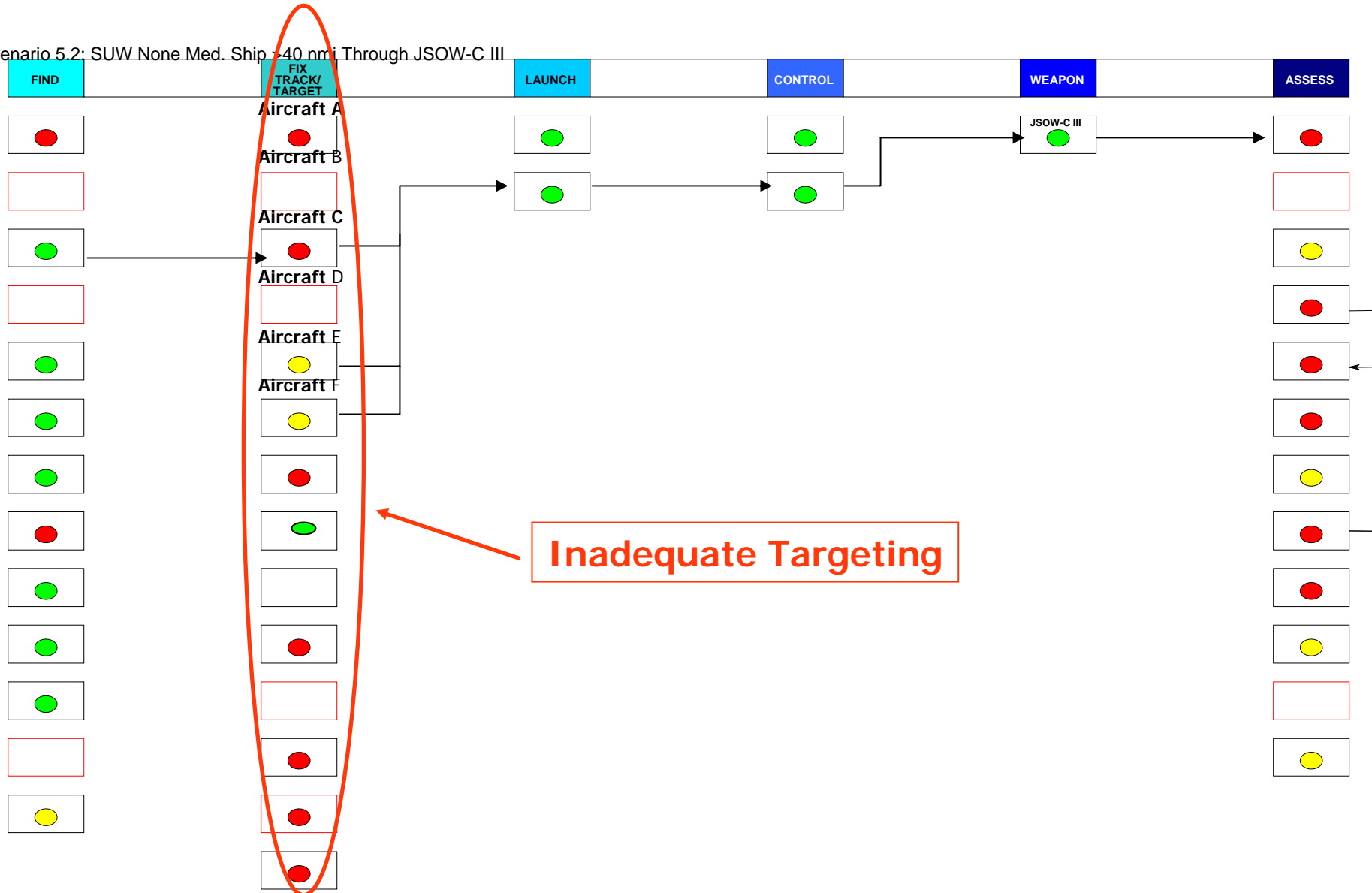
- = 0 to 40 % probability of successful execution of a kill-chain activity
- = 41 to 79% probability of successful execution of a kill-chain activity
- = 80 to 100 % probability of successful execution of a kill-chain activity



Example Utility of Kill Chains:

SuW with Joint Standoff Weapon (JSOW) Block 3

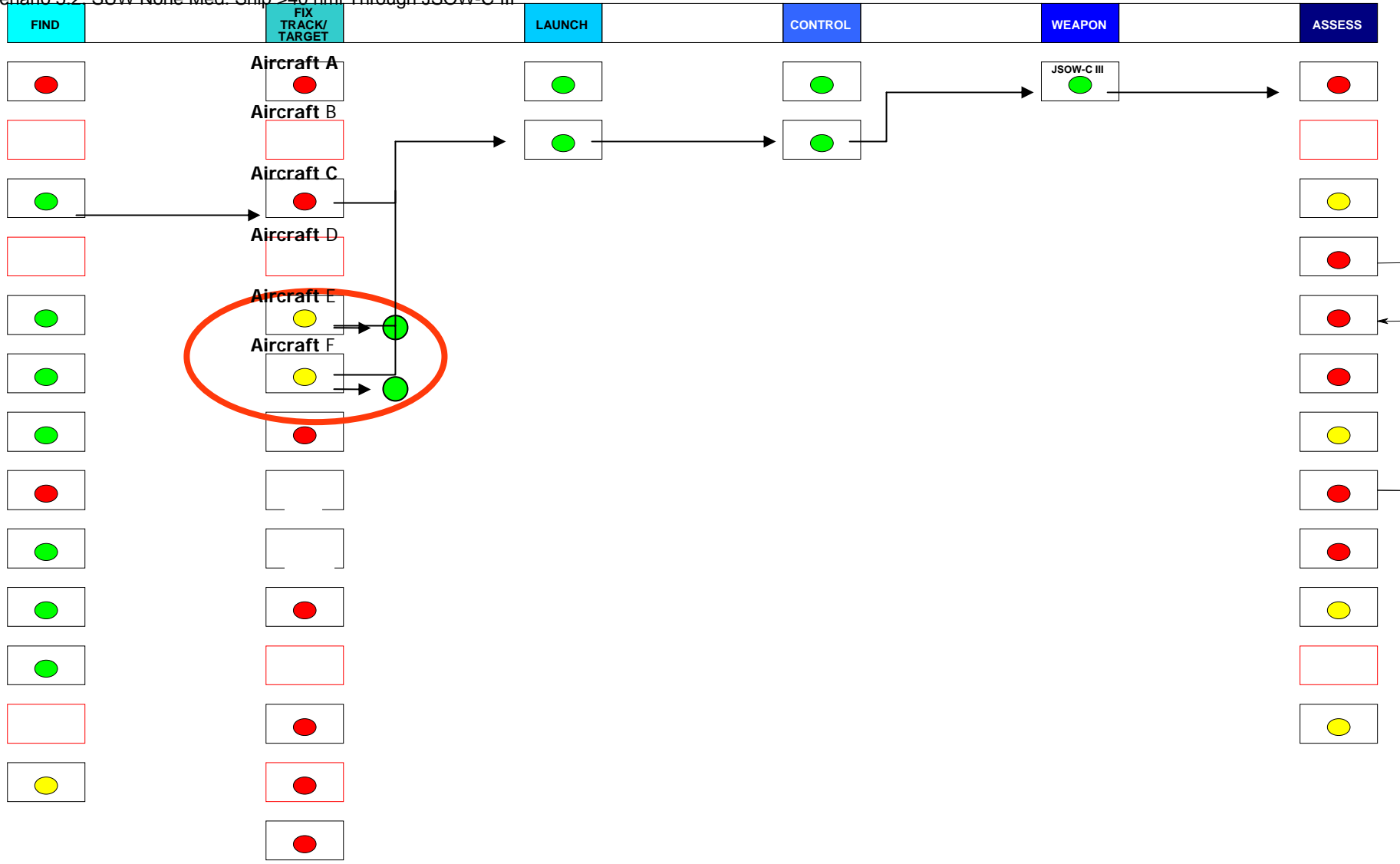
Scenario 5.2: SuW None Med. Ship > 40 nmi Through JSOW-C III





Radar Upgrade

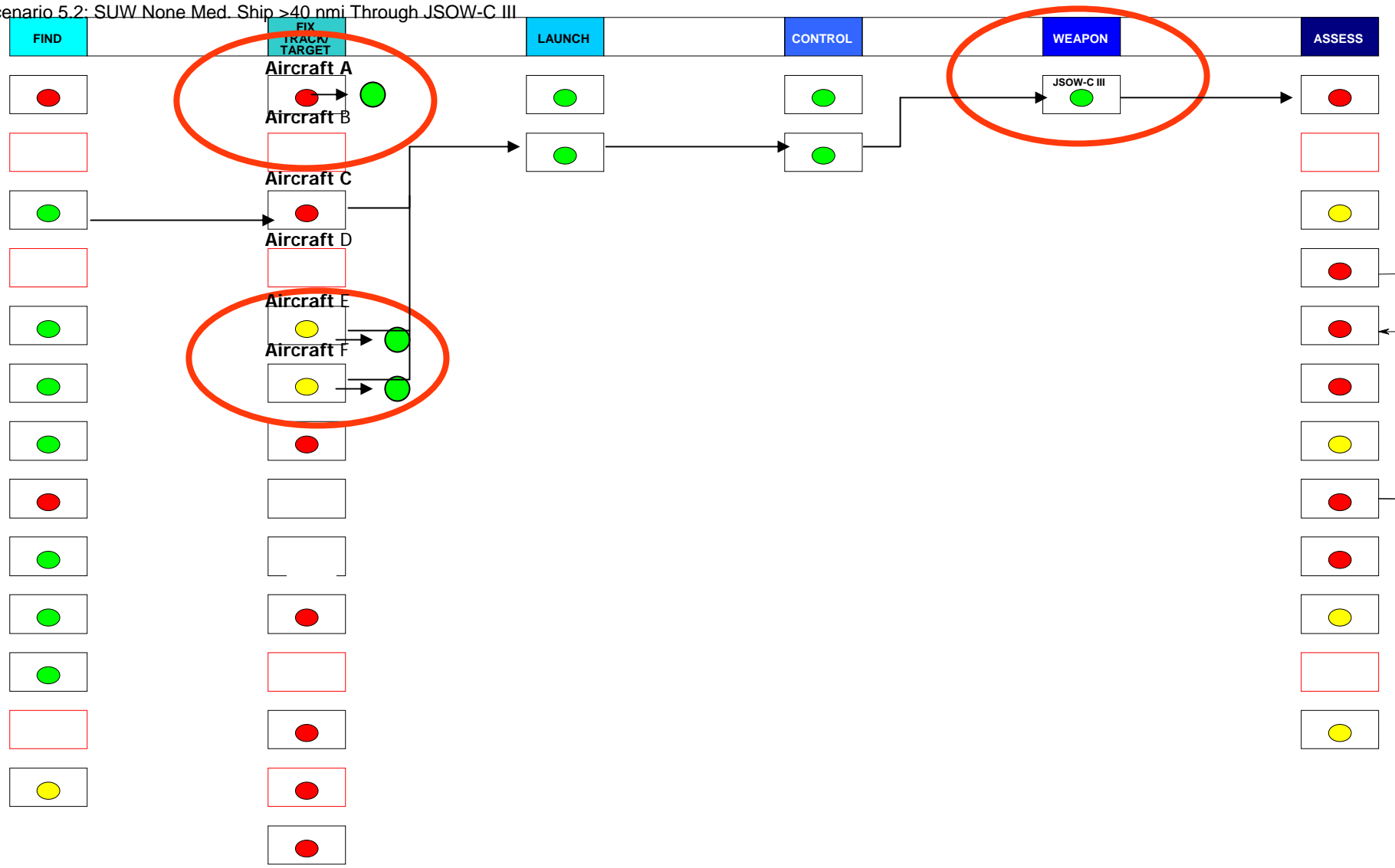
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Weapon Data Link Network (WDLN) Upgrade

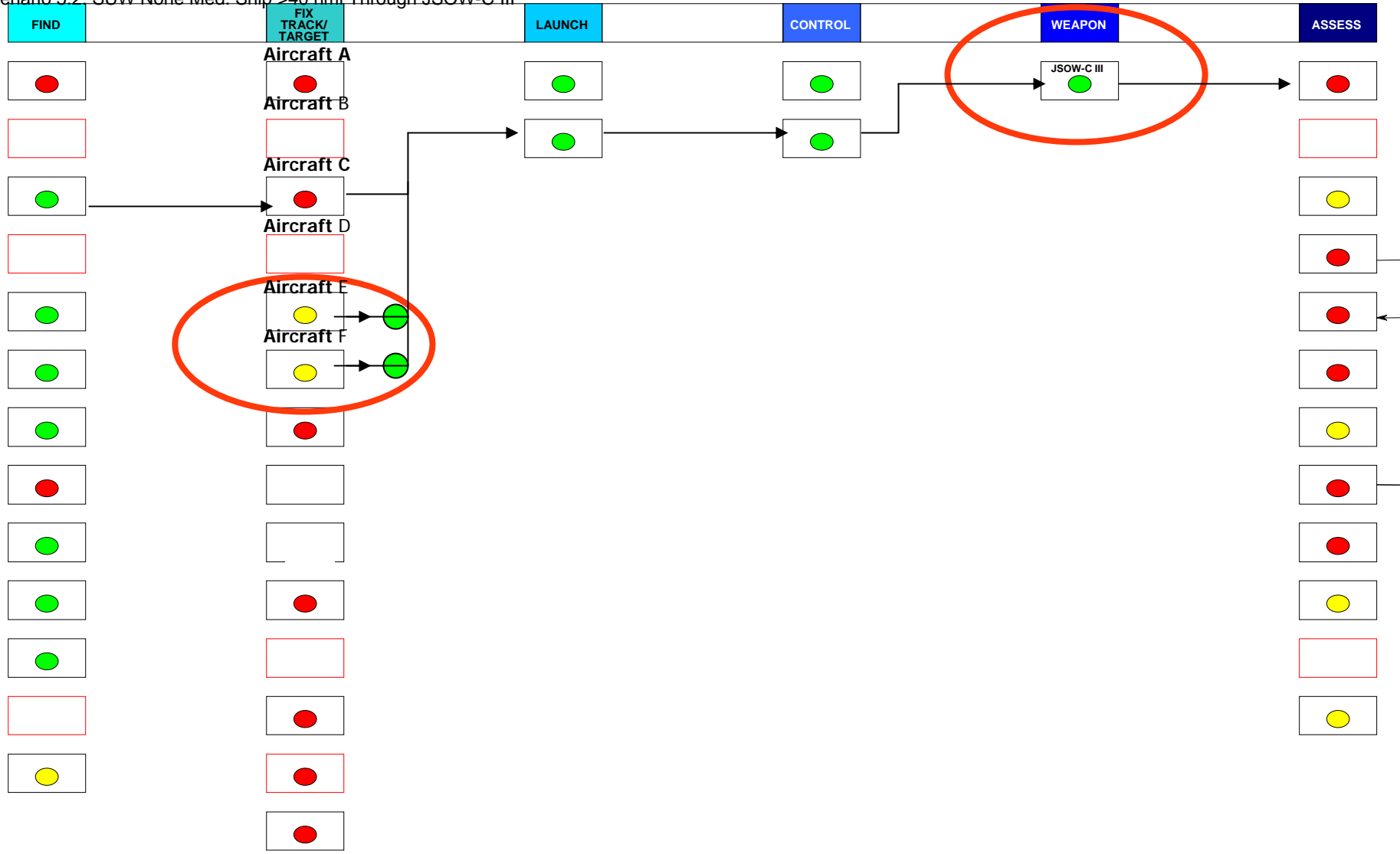
Scenario 5.2: SUW None Med. Ship >40 nmi Through JSOW-C III





Seeker Upgrade

Scenario 5.2: SUW None Med. Ship >40 nmi Through JSOW-C III





Solution



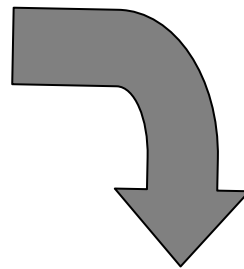
<u>Recommendation</u>	<u>Cost</u>
Upgrade Aircraft Radar	\$XX Millions
WDLN Messages	Leverage existing funded effort; \$XXM to complete
Seeker	\$0 (Realign program funds)



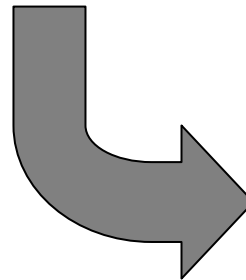
Proposed Kill Chain Solutions

Solutions:

- 1) Upgrade Radar
- 2) WDLN Messages
- 3) Weapon Seeker

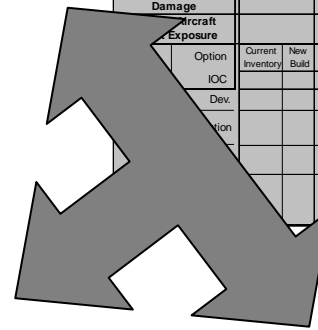


AoA



Trade Studies

Land Moving Target Trade Sheet - Fixed Wing														
Current Capability					Future Capability									
		Standoff		Direct Attack		Standoff				Direct Attack				
		Weapon A	Weapon B	WPN C	Weapon D	Weapon E	Weapon F	Weapon G	Weapon H	Weapon I	Weapon J	Weapon K	Weapon L	
Weapon Terminal Accuracy														
All Weather														
BHI/BDA														
Armor														
Multiple Movers														
Self														
Targeting	3rd Party													
IFTU														
Low Collateral Damage														
Aircraft Exposure				DA										
	Option	Current Inventory	New Build	Current Inventory	Current Inventory	New Build	Not Planned	Not Planned	New Build	New Build	NEW BUILD	Not Planned	Not Planned	
	IOC												2010	
	Dev.													
	ation													



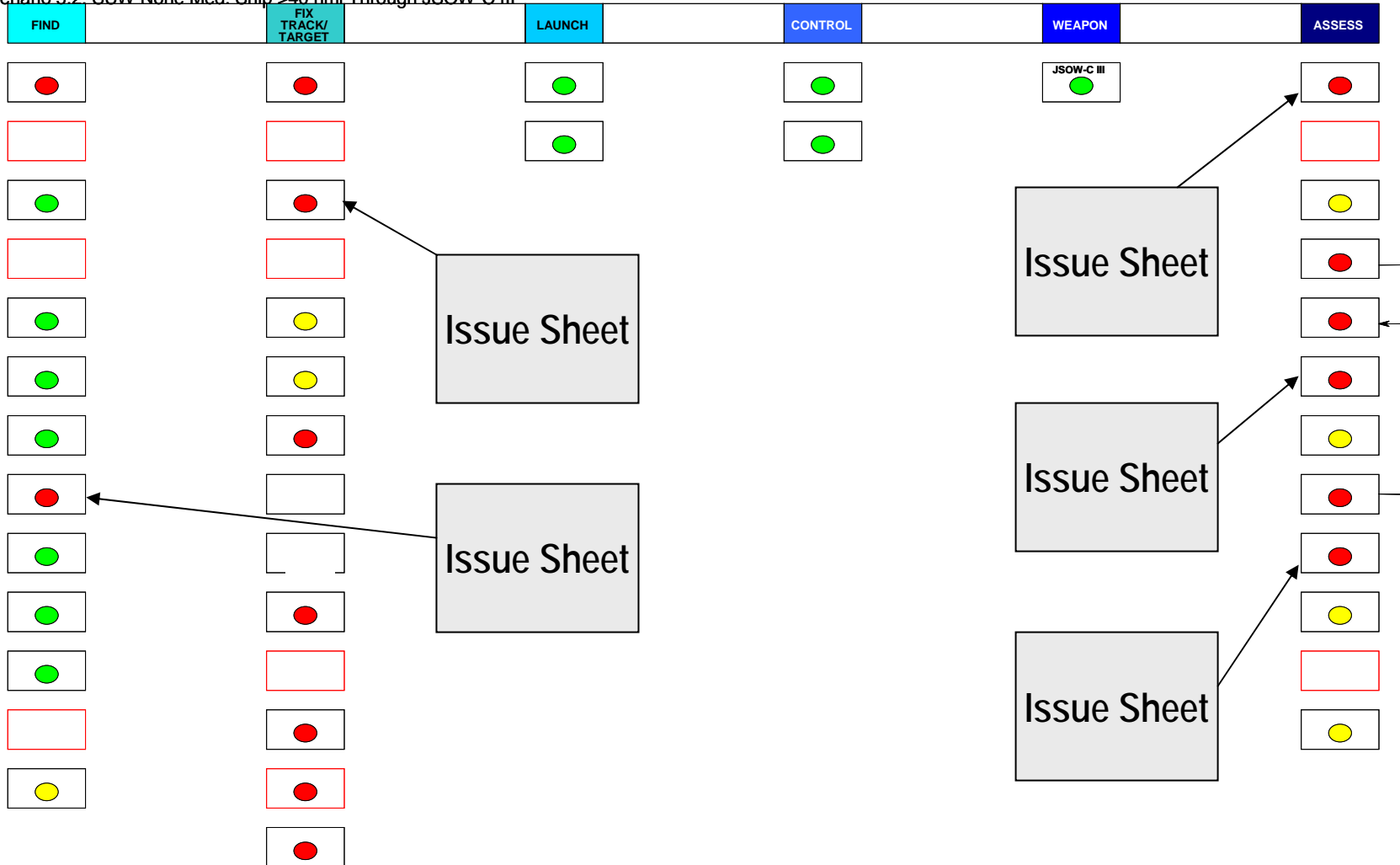
Issue Sheet



POM08 Capability Brief



Scenario 5.2: SUW None Med. Ship >40 nmi Through JSOW-C III





Results: Common Deficiencies

- Align weapon targeting requirements and platform targeting capabilities:
Often they do not match.
- Moving Target
- All Weather
- Damage Assessment
- CID and Approval
- Data link connectivity



Summary

- Kill Chains don't solve world hunger but:
 - Do a great job of forcing end-to-end systems engineering
 - We deliver capabilities, not weapons or black boxes
 - Force cross-PMA, cross discipline, cross-service communication that is required to build and coordinate a capability. - A huge success here:
 - Has lead to new demo plans and new future kill chain capabilities
 - Has lead to the writing and rewriting of requirements documents
 - Identify gaps, weaknesses or redundancies in capabilities
 - Provide a very effective decision to resource sponsors and leadership.
 - What do I need to buy to get a capability.
 - What happens to my capability if I cancel/don't buy a program.

*Capability Based POM08 Brief Presented to N78 on 26
October 2005 by Eight Program Offices Across Three PEOs*



Acronyms

1. AAW--Air-to-Air Warfare
2. AEA--Airborne Electronic Attack
3. AoA--Analysis of Alternatives
4. ASE--Aircraft Survivability Equipment
5. ASW--Anti-Submarine Warfare
6. BHI—Battle Hit Indicator
7. C2—Command and Control
8. CID—Combat Identification
9. CMD--Cruise Missile Defense
10. F2T2EA—Find, Fix, Track, Target, Engage, Assess



Acronyms

1. JSOW—Joint Standoff Weapon
2. MiDEF—MIL-STD-3014 Message Format
3. ISR—Intelligence, Surveillance, Reconnaissance
4. LMT—Land Moving Target
5. SLAM ER—Standoff Land Attack Missile Expanded Response
6. SuW--Surface Warfare
7. TST—Time Sensitive Targeting
8. UAI—Universal Armament Interface
9. WDL—Weapon Data Link
10. WDLN—Weapon Data Link Network